

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Kamps, et al.	
Application No.: 10/597,586	Group Art Unit: 1796
Filed: October 11, 2006	Examiner: Terressa M. Boykin
Title: Process for Production of Copolycarbonates with Reduced Color	Confirmation No: 3248
Attorney Docket No.: GEPL.P-070-2	
Customer Number: 43247	

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CORRECTED PUBLICATION

Sir:

The above-captioned patent application was published as US Publication No. 2008-0076902-A1 on March 27, 2008. Applicants respectfully request republication because several material errors were made in the claims of the publication. The amendments to the claims made in the Preliminary Amendment filed on October 11, 2006 were not included in the publication. Enclosed, for your reference, is a copy of the Preliminary Amendment as filed.

Additionally, a “material” typographical error was made in Claim 1 where the word “unproved” should be “improved”. Thus, on page 10, first column, fifth line from the bottom should read as shown: –result in a product copolycarbonate with improved–. The Preliminary Amendment has the correct information.

No fee is believed to be due with this request since these errors were made by the USPTO.

Respectfully,



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Kamps et al.	
Application No.: 10/597,586	
Filed: 7/31/2006	Group Art Unit:
Title: Process for production of copolycarbonates with reduced color	Examiner:
Attorney Docket No.: GEPL.P-070-2	Conf. No.: 3248

PRELIMINARY AMENDMENT UNDER 37 CFR 1.115

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Preliminary to the Examination of the above-referenced application, please amend this application as follows:

Amendment to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

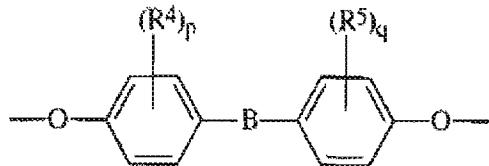
Listing of Claims:

1. (currently amended) A method of producing a copolycarbonate with improved color wherein the method comprises the steps of,

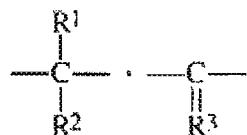
i. preparing a molten reaction mixture comprising a first dihydroxy aromatic compound comprising monomer residue (a), a second dihydroxy aromatic compound comprising monomer residue (b), and a carbonate source,

wherein monomer residue (a) is a quinone structure, or a structure capable of forming a quinone structure upon oxidation,

wherein monomer residue (b) is a quinone structure, or a structure capable of forming a quinone structure upon oxidation different from monomer residue (a) or is,



where B is



-O-, -CO-, -S-, -SO₂-, a C₆ - C₂₀ aromatic radical, or a C₆ - C₂₀ cycloaliphatic radical; the groups R¹ and R² are independently a hydrogen atom, C₁ - C₂₀ alkyl radical, C₄ - C₂₀ cycloalkyl radical, or C₄ - C₂₀ aryl radical; or R¹ and R² together form a C₄ - C₂₀ cycloaliphatic ring which is optionally substituted by one or more C₁ - C₂₀ alkyl, C₆ - C₂₀ aryl, C₅ - C₂₁ aralkyl, C₅ - C₂₀ cycloalkyl groups or a combination thereof, R³ is a divalent hydrocarbylene group, and R⁴ and R⁵ are independently a hydrogen atom, halogen atom, nitro group, cyano group, C₁ - C₂₀ alkyl radical C₄ - C₂₀ cycloalkyl radical, or C₆ - C₂₀ aryl radical and p and q are both integers from 0 to 4,

ii. selecting a catalyst introduction strategy sufficient to result in a product copolycarbonate with improved color, wherein the catalyst introduction strategy is selected from the group consisting of,

1. introducing a polymerization catalyst to the molten reaction mixture after monomer residues (a), monomer residues (b), and carbonate source are melted and prior to substantial polymerization,
2. introducing a polymerization catalyst to the reaction mixture or monomer residues prior to melting with the proviso that residence time of the process from the start of melting until substantial polymerization has occurred is less than 4 hours, and
3. or a combination thereof,

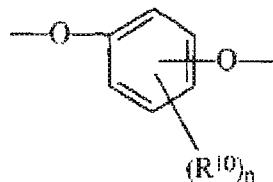
wherein the polymerization catalyst is an inorganic catalyst, an organic catalyst, or both inorganic and organic catalyst which may be introduced separately or together,

- iii. introducing the catalyst according to the selected catalyst introduction strategy,
- iv. introducing the reaction mixture to a series of process units, wherein said series of process units comprises, in sequence, a monomer mix tank and a plurality of polymerization process units in which polymerization occurs and copolymer molecular weight increases, and
- v. allowing the reaction mixture to polymerize in the series of process units thereby forming copolycarbonate, wherein the copolycarbonate has improved color as compared to a copolycarbonate formed in a melt process without the steps of selecting a catalyst introduction strategy and introducing catalyst according to the selected strategy.

2. (currently amended) The method of claim 1, wherein the polymerization catalyst comprises an organic catalyst and an inorganic catalysts and is introduced to the reaction mixture after monomer residues (a), monomer residues (b), and carbonate source are melted and prior to substantial polymetization.

3. (original) The method of claim 2, wherein the inorganic catalyst is NaOH and the organic catalyst is selected from the group consisting of TMAH, TBPA, and combinations thereof.

4. (original) The method of claim 2, wherein monomer residue (a) has the structure,



where each R¹⁰ is independently at each occurrence a hydrogen atom, halogen atom, nitro group, cyano group, C₁ - C₂₀ alkyl, C₄ - C₂₀ cycloalkyl radical, C₄ - C₂₀ aryl radical, and n is an integer from 0 to 4.

5. (original) The method of claim 4, wherein monomer residue (a) is catechol, resorcinol, hydroquinone, butyl hydroquinone, methyl hydroquinone or any combination thereof.
6. (original) The method of claim 2, wherein monomer residue (b) is BPA.
7. (original) The method of claim 2, wherein the carbonate source is diphenyl carbonate.
8. (original) The method of claim 2, wherein the carbonate source is an activated carbonate.
9. (original) The method of claim 8, wherein the activated carbonate is bismethylsalicylcarbonate.
10. (original) The method of claim 2, wherein up to 50 mole% of the carbonate source is selected from the group consisting of dicarboxylic acids, dicarboxylic acid esters, dicarboxylic acid halide or any combination thereof.
11. (original) The method of claim 2, wherein the inorganic and organic catalysts are introduced together.
12. (original) The method of claim 11, wherein the inorganic and organic catalysts are introduced with monomer residue (a), monomer residue (b), the carbonate source or combinations thereof.
13. (currently amended) The method of claim 11, wherein the inorganic and organic catalysts are introduced to the reaction mixture in a separate feed to the a monomer mix tank, a first process unit of the plurality of polymerization process units, or a feed line to the a first process unit.
14. (original) The method of claim 2, wherein the inorganic and organic catalysts are introduced to the molten reaction mixture at separate points.
15. (currently amended) The method of claim 14, wherein the organic catalyst is introduced to the molten reaction mixture prior to a first process unit of the plurality of polymerization process units and the inorganic catalyst is introduced to the molten reaction mixture after the introduction of the organic catalyst and prior to substantial polymerization of the reaction mixture.
16. (original) The method of claim 14, wherein the organic catalyst is introduced with monomer residue (a), monomer residue (b), the carbonate source or combinations thereof and the inorganic catalyst is introduced to the molten reaction mixture after the introduction of monomer (a).
17. (currently amended) The method of claim 14, wherein the inorganic catalyst is introduced to the molten reaction mixture in a feed line from the a monomer mix tank to a first process unit of the plurality of polymerization process units, the first process unit, a feed line to a second process unit of the plurality of polymerization process units, the second process unit, a feed line to a third process unit of the plurality of polymerization process units, the third process unit, or combinations thereof.

18. (original) The method of claim 2, wherein the method further comprises the step of introducing a dihydric phenol to the molten reaction mixture within the series of process units through late monomer addition.

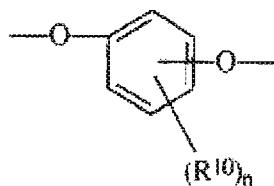
19. (original) The method of claim 1, wherein the polymerization catalyst comprises organic and inorganic catalysts and is introduced to the reaction mixture or monomer residues prior to melting with the proviso that residence time of the process from the start of melting until substantial polymerization has occurred is less than 4 hours.

20. (original) The method of claim 19, wherein the residence time of the process from the start of melting until substantial polymerization has occurred is 30 minutes or less.

21. (original) The method of claim 20, wherein the residence time of the process from the start of melting until substantial polymerization has occurred is 15 minutes or less minutes.

22. (original) The method of claim 19, wherein the inorganic catalyst is NaOH and the organic catalyst is selected from the group consisting of TMAH, TBPA, and combinations thereof.

23. (original) The method of claim 19, wherein monomer residue (a) has the structure,



where each R^{10} is independently at each occurrence a hydrogen atom, halogen atom, nitro group, cyano group, $C_1 - C_{20}$ alkyl, $C_4 - C_{20}$ cycloalkyl radical, $C_4 - C_{20}$ aryl radical, and n is an integer from 0 to 4.

24. (original) The method of claim 19, wherein monomer residue (a) is catechol, resorcinol, hydroquinone, butyl hydroquinone, methyl hydroquinone or any combination thereof.

25. (original) The method of claim 19, wherein monomer residue (b) is BPA.

26. (original) The method of claim 19, wherein the carbonate source is diphenyl carbonate.

27. (original) The method of claim 19, wherein the carbonate source is an activated carbonate and is bismethylsalicylcarbonate.

28. (original) The method of claim 19, wherein up to 50 mole% of the precursor of the carbonate source is derived from the group consisting of dicarboxylic acids, dicarboxylic acid esters, dicarboxylic acid halide or any combination thereof.

29. (original) The method of claim 19, wherein the inorganic and organic catalysts are introduced together or separately.

30. (currently amended) The method of claim 50, wherein the inorganic and organic catalysts are introduced to the a monomer mix tank or a melter together with monomer residue (a), together with monomer residue (b), together with the carbonate source, in a separate feed or combinations thereof.

31. (original) The method of claim 1, wherein the polymerization catalyst comprises organic and inorganic catalysts,

wherein the organic catalyst is introduced to the reaction mixture or monomer residues prior to melting with the proviso that residence time of the process from the start of melting until substantial polymerization has occurred is less than 4 hours, and

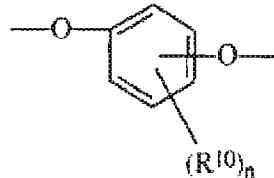
wherein the inorganic catalyst is introduced to the reaction mixture after monomer residues (a), monomer residues (b), and carbonate source are melted, and wherein the introduction occurs prior to substantial polymerization.

32. (original) The method of claim 31, wherein the residence time of the process from the start of melting until substantial polymerization has occurred is 30 minutes or less.

33. (original) The method of claim 32, wherein the residence time of the process from the start of melting until substantial polymerization has occurred is 15 minutes or less.

34. (original) The method of claim 31, wherein the inorganic catalyst is NaOH and the organic catalyst is selected from the group consisting of TMAH, TBPA, and combinations thereof.

35. (original) The method of claim 31, wherein monomer residue (a) has the structure,



where each R^{10} is independently at each occurrence a hydrogen atom, halogen atom, nitro group, cyano group, $C_1 - C_{20}$ alkyl, $C_4 - C_{20}$ cycloalkyl radical, $C_4 - C_{20}$ aryl radical, and n is an integer from 0 to 4.

36. (original) The method of claim 35, wherein monomer residue (a) is catechol, resorcinol, hydroquinone, butyl hydroquinone, methyl hydroquinone or any combination thereof.

37. (original) The method of claim 31, wherein monomer residue (b) is BPA.

38. (original) The method of claim 31, wherein the carbonate source is diphenyl carbonate.

39. (original) The method of claim 31, wherein the carbonate source is an activated carbonate and is bismethylsalicylcarbonate.

40. (original) The method of claim 31, wherein up to 50 mole% of the precursor of the carbonate source is derived from the group consisting of dicarboxylic acids, dicarboxylic acid esters, dicarboxylic acid halide or any combination thereof.

41. (currently amended) The method of claim 31, wherein the organic catalyst is introduced to the a monomer mix tank or a melter together with monomer residue (a), together with monomer residue (b), together with the carbonate source, in a separate feed or combinations thereof, and

wherein the inorganic catalyst is introduced to the molten reaction mixture, within the a monomer mix tank, a feed line from the a monomer mix tank to a first process unit of the plurality of polymerization process units, the first process unit, a feed line to a second process unit of the plurality of polymerization process units, the second process unit, a feed line to a third process unit of the plurality of polymerization process units, the third process unit, or combinations thereof.

42. (original) The method of claim 1, wherein the copolymer has a molecular weight Mw of at least 10,000 g/mole (Polystyrene standards) and the molecular weight Mw is subsequently increased to a value higher than 25,000 g/mole (Polystyrene standards) using a standard extrusion step.

43. (original) The method of claim 1, wherein the copolymer has a molecular weight Mw of at least 10,000 g/mole (Polystyrene standards) and the molecular weight Mw is subsequently increased to a value higher than 25,000 g/mole (Polystyrene standards) by further reaction of oligomers by means of solid state polymerization.

44-45. (canceled)

REMARKS/ARGUMENTS

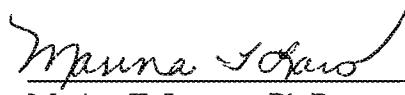
This application is a PCT national phase of PCT/US2005/002186 which claims priority from the application which has issued as US Patent No. 7,057,004. This amendment is made to amend independent claim 1 to render it different in scope from claim 1 of issued US Patent No. 7,057,004. A terminal disclaimer is filed herewith.

Applicants also enclose an information disclosure statement (IDS) for this application which lists the references of record in the prosecution of the '004 patent. Copies of the reference should be available in that file (S/N 10/768,575) and therefore are not attached with the IDS. However, copies will be made available upon request. In addition, the IDS includes a copy of the International Preliminary Report on Patentability (IPRP) for the parent PCT application. In this IPRP, the European Examiner refers to US 2003/149223, and in particular Examples 6-26 thereof as rendering claim 1 of the European application unpatentable. While this reference was of record in the prosecution of the '004 case, it is not clear that the Examiner specifically considered the disclosure of these examples.

In particular, Applicants point out that the total processing time in Example 6 of US 2003/149223 is less than the 4 hours recited in claim 1 of the present application and the '004 patent. It is noted, however, that this is a batch reaction system, in which all of the steps are performed in a single vessel. The processing time at the various steps is therefore expected to be shorter than comparable steps in a process apparatus which has a series of processing units as in claim 1 of the '004 patent and a monomer mix tank and a plurality of polymerization process units in which polymerization and molecular weight increase occur. Thus, the reference is not anticipatory because it has only one reaction vessel, and does not suggest the claimed invention because there is no suggestion that controlling the total reaction time after melting is a result effective parameter which needs to be optimized.

For the foregoing reasons, Applicants submit that this application is now in form for allowance.

Respectfully submitted,



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